Thomsen JF, Gerr F, Atroshi I. Carpal tunnel syndrome and the use of computer mouse and keyboard: A systematic review. BMC Musculoskeletal Disorders 2008;9:134.

Design: Systematic review of observational studies

Databases/selection and rating of articles:

- 8 epidemiological studies examining the association between computer use and CTS and 3 studies of repetitive work and CTS
- Search of PubMed, EMBASE, Web of Science, and Arbline (a database maintained by Lund University in Sweden), covering articles indexed up to August 2008
- Inclusion criteria required that the study be published in English and that they be (1) cross-sectional or longitudinal contrasting workers exposed and not exposed to computer work with mouse or keyboard, or (2) case-control studies with computer work specified as an exposure
- CTS diagnosis was required to be ascertained with symptoms in combination with nerve conduction tests, or by symptoms combined with a qualitative interview
- Studies using workers' compensation data were excluded
- No scoring system was used for quality rating; but general principles were applied
    - longitudinal studies were considered better than cross-sectional and case-control;
    - objective measures of exposure were better than self-report;
    - symptoms plus nerve conduction studies were better than symptoms alone;
    - a short follow-up period was better than a long-term period when baseline measures were reported;
    - whether age and sex were adjusted for as potential confounders;
    - sample size, blinding of participants, and blinding of examiners were considered

Main outcome measures:

- One population-based study reported that keyboard use was negatively related to CTS (more hours of keyboarding meant lower risk of CTS)
- One study conducted in India did show a significant increase in CTS with increasing hours of computer work, but blinding was not described and some workers were using the computer 12 hours a day
- Mouse use, but not keyboarding, was associated with increased risk of CTS in two studies, one a cohort study and the other a cross-sectional study with a case-control analysis of data
- A study which examined repetitive work pooled workers with high levels of keyboard use (data entry) with workers who had high levels of non-computer use (mail sorters); it reported an elevated occurrence of CTS (odds ratio=1.86 for every 10 hours of repetitive work)

- An 11-year cohort study which did not adjust for age and gender reported no association between CTS and repetitive work or keyboarding
- A case-control study with 156 CTS cases which asked participants about work activities reported no relationship between CTS and hours of typing
- Results from the 3 studies of other kinds of repetitive, low-force work and CTS did not provide evidence of a relationship between that work and CTS
- In addition to the studies of work and CTS, the authors also looked at studies of median nerve function and work activities; most of these used vibration sense perception, which is not a good indicator of CTS
- Carpal tunnel pressure, a surrogate for CTS risk, showed modest increases in computer users, but these were below what is generally considered to be potentially harmful levels

Author's conclusions:

- The epidemiological evidence of an association between computer use and CTS is inconsistent, due to bias, lack of consistency, and low statistical power
- Most computer use involves very little force; there may be some increased carpal tunnel pressure with very heavy mouse use
- A definitive study of computer use and CTS would need to involve a large number of subjects, observed prospectively, and without bias; this study would be costly to conduct but is recommended

Comments:

- Overall, the this study was well thought out, with recognition of the difficulties involved in estimating the association between CTS and computer use
- The authors' design excluded studies of workers' compensation cases of CTS, but did include studies of unionized workers whose membership was aware of the purpose of the study
- A scoring system was not used, and was replaced by a descriptive statement of preferred study design; this is reasonable to do when quantitative risk assessment is unlikely to succeed
- However, it is not clear why the authors expressed a preference for short follow-up over long follow-up (as they state in their methods section), unless they are concerned about a failure to record changing exposure levels as a study period is prolonged

Assessment: Adequate for an evidence statement that computer keyboarding is unlikely to cause CTS but that intensive mouse use may be associated